

Phase Separation Induced By Shear Quenching in Polymer Blends with a Diblock Copolymer

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The effects of adding A-B diblock copolymer to a polymer blend (A/B) on phase separation kinetics and morphology have been investigated in a fixed shallow quench condition ($\Delta T = 1.5^\circ\text{C}$) by *in-situ* time-resolved light scattering and phase contrast optical microscopy. A shear quench technique is employed in this study instead of a conventional temperature quench method. Mixtures of nearly monodisperse low relative molecular mass polybutadiene ($M_w = 2.8 \times 10^3$ gm/mol), polystyrene ($M_w = 2.6 \times 10^3$ gm/mol), and a near symmetric butadiene-styrene diblock copolymer ($M_w = 6.3 \times 10^3$ gm/mol) as an interfacial modifier were studied. We observed that the addition of the diblock copolymer could either retard or accelerate the phase separation kinetics depending on the concentration of the diblock copolymer in homopolymer blends. In contrast to the conventional temperature quench, we observe complex phase separation kinetics in the intermediate and late stage of spinodal decomposition by the shear-quench technique.

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